UNIT TERMINAL OBJECTIVE

6-3 At the completion of this unit, the EMT-Critical Care Technician student will be able utilize assessment findings to formulate a field impression and implement the treatment plan for a pediatric patient.

COGNITIVE OBJECTIVES

At the completion of this unit, the EMT-Critical Care Technician student will be able to:

- 6-3.1 Identify methods/ mechanisms that prevent injuries to infants and children. (C-1)
- 6-3.2 Identify the growth and developmental characteristics of infants and children. (C-2)
- 6-3.3 Identify anatomy and physiology characteristics of infants and children. (C-2)
- 6-3.4 Describe techniques for successful assessment of infants and children. (C-1) Identify the common responses of families to acute illness and injury of an infant or child. (C-1)
- 6-3.5 Describe techniques for successful interaction with families of acutely ill or injured infants and children. (C-1)
- 6-3.6 Outline differences in adult and childhood anatomy and physiology. (C-3)
- 6-3.7 Discuss pediatric patient assessment. (C-1)
- 6-3.8 Identify "normal" age group related vital signs. (C-1)
- 6-3.9 Discuss the appropriate equipment utilized to obtain pediatric vital signs. (C-1)
- 6-3.10 Determine appropriate airway adjuncts for infants and children. (C-1)
- 6-3.11 Discuss complications of improper utilization of airway adjuncts with infants and children. (C-1)
- 6-3.12 Discuss appropriate ventilation devices for infants and children. (C-1)
- 6-3.13 Discuss complications of improper utilization of ventilation devices with infants and children. (C-1)
- 6-3.14 Discuss appropriate endotracheal intubation equipment for infants and children. (C-1)
- 6-3.15 Identify complications of improper endotracheal intubation procedure in infants and children. (C-1)
- 6-3.16 Define respiratory distress. (C-1)
- 6-3.17 Define respiratory failure. (C-1)
- 6-3.18 Define respiratory arrest. (C-1)
- 6-3.19 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for respiratory distress/ failure in infants and children. (C-1)
- 6-3.20 Discuss the pathophysiology of respiratory distress/ failure in infants and children. (C-1)
- 6-3.21 Discuss the assessment findings associated with respiratory distress/ failure in infants and children. (C-1)
- 6-3.22 Discuss the management/ treatment plan for respiratory distress/ failure in infants and children. (C-1)
- 6-3.23 List the indications for gastric decompression for infants and children. (C-1)
- 6-3.24 Differentiate between upper and lower airway obstruction. (C-2)
- 6-3.25 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for croup in infants and children. (C-1)
- 6-3.26 Discuss the pathophysiology of croup in infants and children. (C-1)
- 6-3.27 Discuss the assessment findings associated with croup in infants and children. (C-1)
- 6-3.28 Discuss the management/ treatment plan for croup in infants and children. (C-1)
- 6-3.29 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for foreign body aspiration in infants and children. (C-1)
- 6-3.30 Discuss the pathophysiology of foreign body aspiration in infants and children. (C-1)
- 6-3.31 Discuss the assessment findings associated with foreign body aspiration in infants and children. (C-1)
- 6-3.32 Discuss the management/ treatment plan for foreign body aspiration in infants and children. (C-1)
- 6-3.33 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for epiglottitis in infants and children. (C-1)
- 6-3.34 Discuss the pathophysiology of epiglottitis in infants and children. (C-1)
- 6-3.35 Discuss the assessment findings associated with epiglottitis in infants and children. (C-1)

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- 6-3.36 Discuss the management/ treatment plan for epiglottitis in infants and children. (C-1)
- 6-3.37 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for asthma/bronchiolitis in infants and children. (C-1)
- 6-3.38 Discuss the pathophysiology of asthma/bronchiolitis in infants and children. (C-1)
- 6-3.39 Discuss the assessment findings associated with asthma/bronchiolitis in infants and children. (C-1)
- 6-3.40 Discuss the management/ treatment plan for asthma/bronchiolitis in infants and children. (C-1)
- 6-3.41 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for pneumonia in infants and children. (C-1)
- 6-3.42 Discuss the pathophysiology of pneumonia in infants and children. (C-1)
- 6-3.43 Discuss the assessment findings associated with pneumonia in infants and children. (C-1)
- 6-3.44 Discuss the management/ treatment plan for pneumonia in infants and children. (C-1)
- 6-3.45 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for foreign body lower airway obstruction in infants and children. (C-1)
- 6-3.46 Discuss the pathophysiology of foreign body lower airway obstruction in infants and children. (C-1)
- 6-3.47 Discuss the assessment findings associated with foreign body lower airway obstruction in infants and children. (C-1)
- 6-3.48 Discuss the management/ treatment plan for foreign body lower airway obstruction in infants and children. (C-1)
- 6-3.49 Discuss the common causes of shock in infants and children. (C-1)
- 6-3.50 Evaluate the severity of shock in infants and children. (C-3)
- 6-3.51 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for shock in infants and children. (C-1)
- 6-3.52 Discuss the pathophysiology of shock in infants and children. (C-1)
- 6-3.53 Discuss the assessment findings associated with shock in infants and children. (C-1)
- 6-3.54 Discuss the management/ treatment plan for shock in infants and children. (C-1)
- 6-3.55 Identify the major classifications of pediatric cardiac rhythms. (C-1)
- 6-3.56 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for cardiac dysrhythmias in infants and children. (C-1)
- 6-3.57 Discuss the pathophysiology of cardiac dysrhythmias in infants and children. (C-1)
- 6-3.58 Discuss the assessment findings associated with cardiac dysrhythmias in infants and children. (C-1)
- 6-3.59 Discuss the management/ treatment plan for cardiac dysrhythmias in infants and children. (C-1)
- 6-3.60 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for tachydysrythmias in infants and children. (C-1)
- 6-3.61 Discuss the pathophysiology of tachydysrythmias in infants and children. (C-1)
- 6-3.62 Discuss the assessment findings associated with tachydysrythmias in infants and children. (C-1)
- 6-3.63 Discuss the management/ treatment plan for tachydysrythmias in infants and children. (C-1)
- 6-3.64 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for bradydysrythmias in infants and children. (C-1)
- 6-3.65 Discuss the pathophysiology of bradydysrythmias in infants and children. (C-1)
- 6-3.66 Discuss the assessment findings associated with bradydysrythmias in infants and children. (C-1)
- 6-3.67 Discuss the management/ treatment plan for bradydysrythmias in infants and children. (C-1)
- 6-3.68 Discuss the primary etiologies of cardiopulmonary arrest in infants and children. (C-1)
- 6-3.69 Discuss basic cardiac life support (CPR) guidelines for infants and children. (C-1)
- 6-3.70 Identify appropriate parameters for performing infant and child CPR. (C-1)
- 6-3.71 Integrate advanced life support skills with basic cardiac life support for infants and children. (C-3)
- 6-3.72 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for seizures in infants and children. (C-1)
- 6-3.73 Discuss the pathophysiology of seizures in infants and children. (C-1)

- 6-3.74 Discuss the assessment findings associated with seizures in infants and children. (C-1)
- 6-3.75 Discuss the management/ treatment plan for seizures in infants and children. (C-1)
- 6-3.76 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for hypoglycemia in infants and children. (C-1)
- 6-3.77 Discuss the pathophysiology of hypoglycemia in infants and children. (C-1)
- 6-3.78 Discuss the assessment findings associated with hypoglycemia in infants and children. (C-1)
- 6-3.79 Discuss the management/ treatment plan for hypoglycemia in infants and children. (C-1)
- 6-3.80 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for hyperglycemia in infants and children. (C-1)
- 6-3.81 Discuss the pathophysiology of hyperglycemia in infants and children. (C-1)
- 6-3.82 Discuss the assessment findings associated with hyperglycemia in infants and children. (C-1)
- 6-3.83 Discuss the management/ treatment plan for hyperglycemia in infants and children. (C-1)
- 6-3.84 Discuss age appropriate vascular access sites for infants and children. (C-1)
- 6-3.85 Discuss the appropriate equipment for vascular access in infants and children. (C-1)
- 6-3.86 Identify complications of vascular access for infants and children. (C-1)
- 6-3.87 Identify common lethal mechanisms of injury in infants and children. (C-1)
- 6-3.88 Discuss anatomical features of children that predispose or protect them from certain injuries. (C-1)
- 6-3.89 Describe aspects of infant and children airway management that are affected by potential cervical spine injury. (C-1)
- 6-3.90 Identify infant and child trauma patients who require spinal immobilization. (C-1)
- 6-3.91 Discuss fluid management and shock treatment for infant and child trauma patient. (C-1)
- 6-3.92 Discuss the pathophysiology of trauma in infants and children. (C-1)
- 6-3.93 Discuss the assessment findings associated with trauma in infants and children. (C-1)
- 6-3.94 Discuss the management/ treatment plan for trauma in infants and children. (C-1)
- 6-3.95 Discuss the assessment findings and management considerations for pediatric trauma patients with the following specific injuries: head/neck injuries, chest injuries, abdominal injuries, extremities injuries, burns.
- 6-3.96 Define child abuse. (C-1)
- 6-3.97 Define child neglect. (C-1)
- 6-3.98 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for abuse and neglect in infants and children. (C-1)
- 6-3.99 Discuss the assessment findings associated with abuse and neglect in infants and children. (C-1)
- 6-3.100 Discuss the management/ treatment plan for abuse and neglect in infants and children. (C-1)
- 6-3.101 Define sudden infant death syndrome (SIDS). (C-1)
- 6-3.102 Discuss the parent/ caregiver responses to the death of an infant or child. (C-1)
- 6-3.103 Describe the epidemiology, including the incidence, morbidity/ mortality, risk factors and prevention strategies for SIDS infants. (C-1)
- 6-3.104 Discuss the pathophysiology of SIDS in infants. (C-1)
- 6-3.105 Discuss the assessment findings associated with SIDS infants. (C-1)
- 6-3.106 Discuss the management/ treatment plan for SIDS in infants. (C-1)

AFFECTIVE OBJECTIVES

At the completion of this unit, the EMT-Critical Care Technician student will be able to:

- 6-2.107 Demonstrate and advocate appropriate interactions with the infant/ child that conveys an understanding of their developmental stage. (A-3)
- 6-2.108 Recognize the emotional dependance of the infant/ child to their parent/ guardian. (A-1)
- 6-2.109 Recognize the emotional impact of the infant/ child injuries and illnesses on the parent/ guardian. (A-1)
- 6-2.110 Recognize and appreciate the physical and emotional difficulties associated with separation of the parent/

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Adapted from the United States Department of Transportation

EMT-Intermediate: National Standard Curriculum

guardian of a special needs child (A-3)

6-2.111 Demonstrate the ability to provide reassurance, empathy and compassion for the parent/ quardian. (A-1)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the EMT-Critical Care Technician student will be able to:

- 6-3.112 Demonstrate the appropriate approach for treating infants and children. (P-2)
- 6-3.113 Demonstrate appropriate intervention techniques with families of acutely ill or injured infants and children. (P-2)
- 6-3.114 Demonstrate an appropriate assessment for different developmental age groups. (P-2)
- 6-3.115 Demonstrate appropriate technique for measuring pediatric vital signs. (P-2)
- 6-3.116 Demonstrate the use of a length-based resuscitation device for determining equipment sizes, drug doses and other pertinent information for a pediatric patient. (P-2)
- 6-3.117 Demonstrate the techniques/ procedures for treating infants and children with respiratory distress. (P-2)
- 6-3.118 Demonstrate proper technique for administering blow-by oxygen to infants and children. (P-2)
- 6-3.119 Demonstrate the proper utilization of a pediatric non-rebreather oxygen mask. (P-2)
- 6-3.120 Demonstrate appropriate use of airway adjuncts with infants and children. (P-2)
- 6-3.121 Demonstrate appropriate use of ventilation devices for infants and children. (P-2)
- 6-3.122 Demonstrate endotracheal intubation procedures in infants and children. (P-2)
- 6-3.123 Demonstrate appropriate treatment/ management of intubation complications for infants and children. (P-2)
- 6-3.124 Demonstrate proper placement of a gastric tube in infants and children. (P-2)
- 6-3.125 Demonstrate appropriate technique for insertion of peripheral intravenous catheters for infants and children. (P-2)
- 6-3.126 Demonstrate appropriate technique for administration of intramuscular, subcutaneous, rectal, endotracheal and oral medication for infants and children. (P-2)
- 6-3.127 Demonstrate appropriate technique for insertion of an intraosseous line for infants and children. (P-2)
- 6-3.128 Demonstrate age appropriate interventions for infants and children with an obstructed airway. (P-2)
- 6-3.129 Demonstrate appropriate airway control maneuvers for infant and child trauma patients. (P-2)
- 6-3.130 Demonstrate appropriate treatment of infants and children requiring advanced airway and breathing control. (P-2)
- 6-3.131 Demonstrate appropriate immobilization techniques for infant and child trauma patients. (P-2)
- 6-3.132 Demonstrate treatment of infants and children with head injuries. (P-2)
- 6-3.133 Demonstrate appropriate treatment of infants and children with chest injuries. (P-2)
- 6-3.134 Demonstrate appropriate treatment of infants and children with abdominal injuries. (P-2)
- 6-3.135 Demonstrate appropriate treatment of infants and children with extremity injuries. (P-2)
- 6-3.136 Demonstrate appropriate treatment of infants and children with burns. (P-2)
- 6-3.137 Demonstrate appropriate parent/ caregiver interviewing techniques for infant and child death situations. (P-2)
- 6-3.138 Demonstrate proper infant CPR. (P-2)
- 6-3.139 Demonstrate proper child CPR. (P-2)
- 6-3.140 Demonstrate proper techniques for performing infant and child defibrillation. (P-2)

DECLARATIVE

- Introduction
 - A. Epidemiology of EMS incidents involving pediatric patients
 - B. Definitions
 - Newborn
 - a. First few hours of life (perinatal period)
 - b. Resuscitation follows Neonatal Advanced Life Support (NALS) guidelines
 - 2. Infant
 - a. Neonatal period (first 28 days of life) is included
 - b. First month after birth to approximately 12 months of age
 - c. Resuscitation follows Pediatric Advanced Life Support (PALS) guidelines
 - 3. Toddler
 - a. A child between 12 and 36 months of age
 - 4. Preschool
 - a. A child between three and five years of age
 - 5. School age
 - a. The child between 6 and 12 years of age
 - 6. Adolescent
 - a. The period between the end of childhood and adulthood (18 years)
 - (1) Early (puberty)
 - (2) Middle (junior high school/ high school age)
 - (3) Late (high school/ college age)
 - b. End of childhood is usually defined as the beginning of puberty
 - (1) Highly child specific
 - (2) Male child average 13 years
 - (3) Female child average 11 years
- II. Anatomy and physiology review
 - A. Head
 - 1. Proportionally larger size
 - 2. Larger occipital region
 - 3. Fontanelles open in infancy
 - 4. Face is small in comparison to size of head
 - 5. EMT-Critical Care Technician implications
 - a. Higher proportion of blunt trauma involves the head
 - b. Different airway positioning techniques
 - (1) Place thin layer of padding under back of seriously injured child < 3 years of age to obtain neutral position
 - (2) Place folded sheet under occiput of medically ill child < 3 years of age to obtain sniffing position
 - c. Examine fontanelle in infants
 - (1) Bulging fontanelle suggests increased intracranial pressure
 - (2) Sunken fontanelle suggests dehydration
 - B. Airway
 - 1. Narrower at all age levels
 - 2. Infants are obligate nasal breathers
 - 3. Jaw is proportionally smaller in young children
 - 4. Larynx is higher (C 3-4) and more anterior

- 5. Cricoid ring is the narrowest part of the airway in young children
- 6. Tracheal cartilage softer
- 7. Trachea smaller in both length and diameter
- 8. Epiglottis
 - a. Omega shaped in infants
 - b. Extends at a 45 degree angle into airway
 - c. Epiglottic folds have softer cartilage, therefore are more floppy, especially in infants
- 9. EMT-Critical Care Technician implications
 - a. Keep nares clear in infants < 6 months of age
 - b. Narrower upper airways are more easily obstructed
 - (1) Flexion or hyperextension
 - (2) Particulate matter
 - (3) Soft tissue swelling (injury, inflammation)
 - c. Differences in intubation technique
 - (1) Gentler touch
 - (2) Straight blade
 - (3) Lift epiglottis
 - (4) Uncuffed tube
 - (5) Precise placement
- C. Chest and lungs
 - 1. Ribs are positioned horizontally
 - 2. Ribs are more pliable and offer less protection to organs
 - 3. Chest muscles are immature and fatigue easily
 - 4. Lung tissue is more fragile
 - 5. Mediastinum is more mobile
 - 6. Thin chest wall allows for easily transmitted breath sounds
 - 7. EMT-Critical Care Technician implications
 - a. Infants and children are diaphragmatic breathers
 - b. Infants and children are prone to gastric distention
 - c. Rib fractures are less frequent but not uncommon in child abuse and trauma
 - d. Greater energy transmitted to underlying organs following trauma, therefore, significant internal injury can be present without external signs
 - e. Pulmonary contusions are more common in major trauma
 - f. Lungs prone to pneumothorax following barotrauma
 - g. Mediastinum has greater shift with tension pneumothorax
 - h. Easy to miss a pneumothorax or misplaced intubation due to transmitted breath sounds
- D. Abdomen
 - Immature abdominal muscles offer less protection
 - 2. Abdominal organs are closer together
 - 3. Liver and spleen proportionally larger and more vascular
 - 4. EMT-Critical Care Technician implications
 - a. Liver and spleen more frequently injured
 - b. Multiple organ injuries more common
- E. Extremities
 - 1. Bones are softer and more porous until adolescence
 - 2. Injuries to growth plate may disrupt bone growth
 - 3. EMT-Critical Care Technician implications

- a. Immobilize any "sprain" or "strain" as it is likely a fracture
- b. Avoid piercing growth plate during intraosseous needle insertion
- F. Skin and body surface area (BSA)
 - Thinner and more elastic
 - 2. Thermal exposure results in deeper burn
 - 3. Less subcutaneous fat
 - 4. Larger surface area to body mass
 - 5. EMT-Critical Care Technician implications
 - a. More easily and deeply burned
 - b. Larger losses of fluid and heat
- G. Respiratory system
 - 1. Tidal volume proportionally similar to that of adolescents and adults
 - 2. Metabolic oxygen requirements of infants and children are approximately double those of adolescents and adults
 - 3. Proportionally smaller functional residual capacity, therefore proportionally smaller oxygen reserves
 - 4. EMT-Critical Care Technician implications
 - a. Hypoxia develops rapidly because of increased oxygen requirements and decreased oxygen reserves
- H. Cardiovascular system
 - 1. Cardiac output is rate dependent in infants and small children
 - 2. Vigorous but limited cardiovascular reserves
 - 3. Bradycardia is a response to hypoxia
 - 4. Can maintain blood pressure longer than an adult
 - 5. Circulating blood volume is proportionally larger than in an adult
 - 6. Absolute blood volume is smaller than in an adult
 - 7. EMT-Critical Care Technician implications
 - a. Smaller absolute volume of fluid/ blood loss needed to cause shock
 - b. Larger proportional volume of fluid/ blood loss needed to cause shock
 - c. Hypotension is a late sign of shock
 - d. A child may be in shock despite normal blood pressure
 - e. Shock assessment is based upon clinical signs of tissue perfusion
 - f. Carefully assess for shock if tachycardia is present
 - g. Monitor carefully for development of hypotension
- I. Nervous system
 - 1. Develops throughout childhood
 - 2. Developing neural tissue is more fragile
 - 3. Brain and spinal cord are less well protected by skull and spinal column
 - 4. EMT-Critical Care Technician implications
 - a. Brain injuries are more devastating in young children
 - b. Greater force transmitted to underlying brain of young children
 - c. Spinal cord injury can occur without spinal column injury
- J. Metabolic differences
 - 1. Infants and children have limited glycogen and glucose stores
 - 2. Significant volume loss can result from vomiting and diarrhea
 - 3. Prone to hypothermia due to increased body surface area
 - 4. Newborns and neonates are unable to shiver to maintain body temperature
 - 5. EMT-Critical Care Technician implications

- a. Keep child warm during treatment and transport
- b. Cover the head to minimize heat loss

III. Assessment

- A. General considerations
 - 1. Many components of the initial patient evaluation can be done by observing the patient
 - 2. Utilize the parent/ guardian to assist in making the infant or child more comfortable as appropriate
 - 3. Interacting with parents and family
 - a. Normal responses to acute illness and injury
 - b. Parent/ guardian and child interaction
 - c. Intervention techniques
- B. Physical exam
 - Scene survey
 - a. Observe the scene for hazards or potential hazards
 - b. Observe the scene for mechanism of injury/ illness
 - (1) Ingestion
 - (a) Pills, medicine bottles, household chemicals, etc.
 - (2) Child abuse
 - (a) Injury and history do not coincide, bruises not where they should be for mechanism of injury, etc.
 - (3) Position patient found
 - c. Observe the parent/ guardian/ caregiver interaction with the child
 - (1) Do they act appropriately
 - (2) Is parent/ guardian/ caregiver concerned
 - (3) Is parent/ guardian/ caregiver angry
 - (4) Is parent/ guardian/ caregiver indifferent
 - 2. Initial assessment
 - a. The general impression
 - (1) General impression of environment
 - (2) General impression of parent/ guardian and child interaction
 - (3) General impression of the patient/ Pediatric Assessment Triangle
 - (a) A structure for assessing the pediatric patient
 - (b) Focuses on the most valuable information for pediatric patients
 - (c) Used to ascertain if any life-threatening condition exists
 - (d) Components
 - i) Appearance
 - a) Mental status
 - b) Muscle tone
 - ii) Work of breathing
 - a) Respiratory rate
 - b) Respiratory effort
 - iii) Circulation
 - a) Skin signs
 - b) Skin color
 - (4) Initial triage decisions
 - (a) Urgent proceed with rapid ABC assessment, treatment, and transport

		(b)	Non urgent - proceed with focused history, detailed physical exam after initial assessment							
b.	Vital fur	actions	anei iniliai assessmeni							
D.			ine level of consciousness							
	(1)		AVPU scale							
		(a)								
			,							
			· ·							
			iii) Responds to painful stimuliiv) Unresponsive							
		(h)								
		(b)	Modified Glasgow Coma Scale							
	(2)	(c)	Signs of inadequate oxygenation							
	(2)	Airway	Determine national							
	(2)	(a)) Determine patency							
	(3)	Breathing (a) Adagusts sheet rise and fall								
		(a)	Adequate chest rise and fall							
		(b)	Use of accessory muscles							
		(c)	Nasal flaring Tachypnea							
		(d) (e)	Bradypnea							
		(f)	Irregular breathing pattern							
		(I) (g)	Head bobbing							
		(9) (h)	Grunting							
		(i)	Absent breath sounds							
		(i) (j)	Abnormal sounds							
	(4)	Circulation								
	(4)	(a)	Pulse							
		(α)	i) Central							
			ii) Peripheral							
			iii) Quality of pulse							
		(b)	Blood pressure							
		(5)	i) Measuring blood pressure is not necessary in children <							
			3 years of age							
		(c)	Skin color							
		(d)	Active hemorrhage							
	(5)		gns in the pediatric patient							
	(3)	(a)	Equipment							
		(b)	Normal age appropriate ranges for:							
		(5)	i) Infant							
			ii) Toddler							
			iii) Preschool							
			iv) School aged							
			v) Adolescent							

3. Transition phase

a. Utilized to allow the infant or child to become familiar with you and your equipment

Proper technique for obtaining the following in pediatric patients

pulse

respirations

blood pressure

(c)

i) ii)

iii)

- b. Use of transition phase depends on the seriousness of the patient's condition
- c. For the conscious, non-acutely ill child
- d. For the unconscious, non-acutely ill child do not perform the transition phase but proceed to the physical examination
- 4. Focused history
 - a. Approach
 - (1) For infant, toddler, and preschool age patient, obtain from parent/guardian
 - (2) For school age and young adolescent patient, most information may be obtained from the patient
 - (3) For older adolescent patient, question the patient in private regarding sexual activity, pregnancy, illicit drug and alcohol use
 - b. Content
 - (1) Chief complaint
 - (a) Nature of illness/injury
 - (b) How long has the patient been sick/injured
 - (c) Presence of fever
 - (d) Effects on behavior
 - (e) Bowel/ urine habits
 - (f) Vomiting/ diarrhea
 - (g) Frequency of urination
 - (2) Past medical history
 - (a) Infant or child under the care of a physician
 - (b) Chronic illnesses
 - (c) Medications
 - (d) Allergies
- 5. Detailed physical exam
 - a. Examine all body regions
 - (1) Head-to-toe in older child
 - (2) Toe-to-head in younger child
 - b. Some or all of the following may be appropriate, depending on the situation
 - (1) Pupils
 - (2) Capillary refill
 - (a) Normal two seconds or less
 - (b) Valuable to assess on patients less than six years of age
 - (c) Less reliable in cold environment
 - (d) Blanch nailbed, base of the thumb, sole of the feet
 - (3) Hydration
 - (a) Skin turgor
 - (b) Sunken or flat fontanelle in an infant
 - (c) Presence of tears and saliva
 - (4) Pulse oximetry
 - (a) Should be utilized on any moderately injured or ill infant or child
 - (b) Hypothermia and shock can alter reading
 - (5) Cardiac monitor
- 6. Ongoing Exam continually monitor the following
 - (1) Respiratory effort
 - (2) Color
 - (3) Mental status

- (4) Pulse oximetry
- (5) Vital signs
- (6) Patient temperature
- C. General management
 - Airway management in pediatric patients
 - a. Basic airway management
 - (1) Manual positioning
 - (a) Allow medical patients to assume position of comfort
 - (b) Support under the torso for trauma patients less than 3 years old
 - (c) Occipital elevation for supine medical patients 3 years of age or older
 - (2) Foreign body airway obstruction basic clearing methods
 - (a) Infants
 - i) Back blows
 - ii) Chest thrusts
 - (b) Children
 - Abdominal thrusts
 - (3) Suction
 - (a) Avoid hypoxia
 - (b) Avoid upper airway stimulation
 - (c) Decrease suction negative pressure (≤100 mm/Hg) in infants
 - (4) Oxygenation
 - (a) Non-rebreather mask
 - (b) Blow-by oxygen if mask is not tolerated
 - (c) Utilize the parent or guardian to deliver oxygen if patient condition warrants
 - (d) Maintain proper head position
 - (5) Oropharyngeal airway
 - (a) Sizing
 - (b) Preferred method of insertion uses the tongue blade to depress the tongue and jaw
 - (6) Nasopharyngeal airway
 - (a) Sizing
 - (b) No major differences in sizing or use compared to adults
 - (7) Ventilation
 - (a) Bag size
 - (b) Proper mask fit
 - (c) Proper mask position and seal (E-C clamp)
 - (d) Ventilate at age appropriate rate (squeeze-release-release)
 - (e) Obtain chest rise with each breath
 - (f) Allow adequate time for exhalation
 - (g) Assess BVM ventilation
 - (h) Apply cricoid pressure to minimize gastric inflation and passive regurgitation
 - (i) Complications of improper technique or equipment
 - b. Advanced airway management
 - (1) Foreign body airway obstruction advanced clearing method
 - (a) Direct laryngoscopy with Magill forceps

- (b) Attempt intubation around foreign body
- (2) Endotracheal intubation in pediatric patients
 - (a) Laryngoscope and appropriate size blades
 - i) Length based resuscitation tape to determine size
 - ii) Straight blade is preferred
 - (b) Appropriate size endotracheal tube and stylette
 - i) Sizing methods
 - a) Length based resuscitation tape
 - b) Numerical formulas
 - c) Anatomical clues
 - Stylette placement
 - (c) Technique for pediatric intubation
 - (d) Depth of insertion
 - (e) Endotracheal tube securing device
 - (f) Complications of improper technique
- (3) Gastric decompression
- 2. Circulation
 - a. Vascular access
 - Intraosseous access in children < 6 years of age in cardiac arrest or if intravenous access fails
 - b. Fluid resuscitation
 - (1) 20 ml/kg of lactated ringer's or normal saline bolus as needed
- 3. Pharmacological
- 4. Non-pharmacological
 - a. Cervical spine immobilization for traumatic cause
- 5. Transport considerations
 - a. Appropriate mode
 - (1) Transport should not be delayed to perform procedures that can be done en route
 - (2) Proper BLS care must be performed prior to any ALS interventions
 - b. Appropriate facility
 - (1) The availability of a receiving hospital with expertise in pediatric care may improve the patient's outcome
- 6. Psychological support/ communication strategies
 - a. Utilize the parent/ guardian to assist in making the infant or child more comfortable
 - b. Encourage parents to help calm the child during painful procedures
 - c. Infants, toddlers, preschool and school aged patients do not like to be separated from parent/ guardian
 - d. Infants and children have a natural fear of strangers; for stable patients, allow them to become accustomed to you before your hands-on assessment
 - e. Give some control of what is going to happen to the patient (which arm to have their IV)
 - f. When possible and practical, physically position your face at the same level as the patient's face to facilitate communication and minimize fear
 - g. Use age-appropriate vocabulary
 - h. Keep patient warm
 - i. Allow child to take their favorite toy/ blanket if possible
 - j. Permit the child to express their feelings (e.g., fear, pain, crying)

- k. Let the child know that certain physical actions (e.g., hitting, biting, spitting) are not permitted
- IV. Specific pathophysiology, assessment and management
 - A. Respiratory compromise
 - 1. Introduction
 - a. Epidemiology
 - b. Categories of respiratory compromise
 - (1) Upper airway obstruction
 - (2) Lower airway disease
 - 2. Pathophysiology
 - a. Respiratory illnesses cause respiratory compromise in airway/ lung
 - (1) Severity of respiratory compromise depends on extent of respiratory illness
 - (2) Approach to treatment depends on severity of respiratory compromise
 - b. Severity
 - (1) Respiratory distress
 - (a) Increased work of breathing
 - (b) Carbon dioxide tension in the blood initially decreases, then increases as condition deteriorates
 - (c) If uncorrected, respiratory distress leads to respiratory failure
 - (2) Respiratory failure
 - (a) Inadequate ventilation or oxygenation
 - (b) Respiratory and circulatory systems are unable to exchange enough oxygen and carbon dioxide
 - (c) Carbon dioxide tension in the blood increases, leading to metabolic acidosis
 - (d) Very ominous condition; patient is on the verge of respiratory arrest
 - (3) Respiratory arrest
 - (a) Cessation of breathing
 - (b) Failure to intervene will result in cardiopulmonary arrest
 - (c) Good outcomes can be expected with early intervention that prevents cardiopulmonary arrest
 - c. Assessment
 - (1) Chief complaint
 - (2) History
 - (3) Physical findings
 - (a) Signs and symptoms of respiratory distress
 - i) Normal mental status ==> irritability or anxiety
 - ii) Tachypnea
 - iii) Retractions
 - iv) Nasal flaring
 - v) Good muscle tone
 - vi) Tachycardia
 - vii) Head bobbing
 - viii) Grunting
 - ix) Cyanosis which improves with supplemental oxygen
 - (b) Signs and symptoms of respiratory failure

- i) Irritability or anxiety ==> lethargy
- ii) Marked tachypnea ==> bradypnea
- iii) Marked retractions ==> agonal respirations
- iv) Poor muscle tone
- v) Marked tachycardia ==> bradycardia
- vi) Central cyanosis
- (c) Signs and symptoms of respiratory arrest
 - i) Obtunded ==> coma
 - ii) Bradypnea ==> apnea
 - iii) Absent chest wall motion
 - iv) Limp muscle tone
 - v) Bradycardia ==> asystole
 - vi) Profound cyanosis
- (4) Ongoing assessment improvement indicated by
 - (a) Improvement in color
 - (b) Improvement in oxygen saturation
 - (c) Increased pulse rate
 - (d) Increased level of consciousness
- d. Management
 - (1) Graded approach to treatment
 - (2) Consider separating parent and child
 - (3) Airway support
 - (a) Manage upper airway obstructions as needed
 - (b) Insert airway adjunct if needed
 - (4) Ventilatory and oxygenation support
 - (a) Respiratory distress/ early respiratory failure
 - i) Administer high flow oxygen
 - (b) Late respiratory failure/ respiratory arrest
 - i) BVM ventilate patient with 100% oxygen via ageappropriate sized bag
 - ii) ETT intubate patient if positive pressure ventilation does not rapidly improve patient condition
 - iii) Consider gastric decompression if abdominal distention is impeding ventilation
 - (5) Circulatory support
 - a) Consider IV or IO
 - (6) Pharmacologic interventions
 - (7) Non-pharmacologic interventions
 - (8) Transport considerations
 - (a) Appropriate mode
 - (b) Appropriate facility
 - (9) Psychological support/ communication strategies
- 3. Upper airway obstruction
 - a. Croup
 - (1) Pathophysiology
 - (a) An inflammatory process of the upper respiratory tract involving the subglottic region
 - (b) Most commonly seen in infants and children between 6 months

and 4 years of age

- (c) Main cause is viral infection of the upper airway
- (d) Another form is spasmodic croup
 - i) Occurs mostly in the middle of the night
 - ii) Usually without prior upper respiratory infection
- (2) Assessment
 - (a) Signs and symptoms of respiratory distress or failure, depending on severity, plus
 - i) Appears sick
 - ii) Stridor
 - iii) Barking (seal- or dog-like) or brassy cough
 - iv) Hoarseness
 - v) Fever (+/-)
 - (b) History
 - Usually with history of upper respiratory infection in classic croup (1-2 days)
 - ii) Rarely progresses to respiratory failure
- (3) Management
 - (a) Airway and ventilatory support
 - i) Humidified or nebulized oxygen
 - ii) Cool mist oxygen at 4 6 L/min
 - (b) Circulatory support
 - (c) Pharmacological interventions
 - (d) Non-pharmacological interventions
 - i) Keep child in position of comfort
 - (e) Transport considerations
 - (f) Psychological support/ communication strategies
 - i) Do not agitate the infant or child (no IV's, blood pressure, etc.)
 - ii) Keep the parent/ guardian/ caregiver with the infant or child if appropriate
- b. Foreign body aspiration
 - (1) Pathophysiology
 - (a) Partial or complete blockage of the upper airway by a foreign body
 - (b) Most common in toddlers and preschool (1-4 years of age) but can occur at any age
 - (c) Objects are usually food (hard candy, nuts, seeds, hot dog) or small objects (coins, balloons)
 - (d) If no interventions or if interventions are unsuccessful, respiratory arrest followed by cardiopulmonary arrest will ensue
 - (e) Partial
 - i) Most children show signs of mild distress
 - ii) Appears anxious, but not toxic
 - iii) Interventions other than oxygen and transport may precipitate complete obstruction
 - (f) Complete
 - i) Most children show signs of severe distress
 - ii) Appears agitated, but not toxic

- iii) If no interventions, respiratory arrest ensues, followed by cardiopulmonary arrest
- (2) Assessment
 - (a) Partial obstruction
 - Signs and symptoms of respiratory distress or failure depending on severity, plus
 - a) Appears irritable or anxious, but not toxic
 - b) Inspiratory stridor
 - c) Muffled or hoarse voice
 - d) Drooling
 - e) Pain in throat
 - ii) History
 - a) Usually a history of choking if observed by adult
 - (b) Complete obstruction
 - Signs and symptoms of respiratory failure or arrest, depending on severity, plus
 - a) Appears agitated or lethargic
 - b) No or minimal air movement
 - ii) History
 - a) History often lacking
 - b) Inability to ventilate despite proper airway positioning
- (3) Management
 - (a) Airway and ventilatory support
 - Partial obstruction
 - a) Place patient in sitting position
 - b) Deliver oxygen by non-rebreather mask or blowby
 - c) DO NOT ATTEMPT TO LOOK IN MOUTH
 - d) Interventions other than oxygen and transport may precipitate complete obstruction
 - ii) Complete obstruction
 - a) Open airway and attempt to visualize the obstruction
 - b) Sweep visible obstructions with your finger (do NOT perform blind finger sweeps)
 - c) Perform BLS foreign body airway obstruction (FBAO) maneuvers
 - d) Attempt BVM ventilations
 - e) Perform laryngoscopy if BVM is unsuccessful
 - f) Remove object if possible with pediatric Magill forceps
 - g) Intubate if possible
 - h) Continue BLS FBAO maneuvers if ALS unsuccessful
 - (b) Circulatory support
 - (c) Pharmacological interventions
 - (d) Non-pharmacological interventions

- (e) Transport considerations
 - i) Notify hospital of patient status
 - ii) Transport expeditiously
- (f) Psychological support/ communication strategies
 - i) Do not agitate patient
 - a) No IV's or medications
 - b) Do not look in patient's mouth
 - ii) Keep caregiver with child, if appropriate
- c. Epiglottitis
 - (1) Pathophysiology
 - Rapidly forming cellulitis of the epiglottis and its surrounding structures
 - (b) Most common in children between 3 and 7 years of age but can occur at any age
 - (c) Bacterial infection, usually Hemophilus influenza type B
 - (d) Increasingly uncommon due to the H-flu vaccine
 - (e) Can be a true life-threatening emergency
 - (2) Assessment
 - (a) Signs and symptoms of respiratory distress or failure, depending on severity, plus
 - i) Appears agitated, sick
 - ii) Stridor
 - iii) Muffled voice
 - iv) Drooling
 - v) Sore throat
 - vi) Pain on swallowing
 - vii) High fever
 - (b) History
 - i) Usually no previous history, but a rapid onset of symptoms (6-8 hours)
 - (c) Can quickly progress to respiratory arrest
 - (3) Management
 - (a) Airway and ventilatory support
 - i) NEVER ATTÉMPT TO VISUALIZE THE AIRWAY IF THE PATIENT IS AWAKE
 - ii) Allow the parent to administer oxygen
 - iii) If airway becomes obstructed, two rescuer ventilation with BVM is almost always effective
 - iv) If BVM is not effective, attempt intubation with stylet in place
 - v) Should not be attempted in settings with short transport times
 - vi) Performing chest compression upon glottic visualization during intubation may produce a bubble at the tracheal opening
 - (b) Circulatory support
 - (c) Pharmacological interventions
 - (d) Non-pharmacological interventions

- (e) Transport considerations
 - i) Allow patient to assume position of comfort
 - ii) Notify hospital of patient status early
 - iii) Transport to the hospital without delay, keeping child warm
- (f) Psychological support/ communication strategies
 - i) DO NOT AGITATE THE PATIENT no IV's, BP, do not look in patient's mouth
 - ii) Keep the parent/ caregiver with the child if appropriate
- 4. Lower airway disease
 - a. Asthma/ bronchiolitis
 - (1) Pathophysiology
 - (a) Bronchospasm, excessive mucous production, inflammation of the small airways
 - (b) Typically in child with known history of asthma
 - (c) Triggered by upper respiratory infections, allergies, changes in temperature, physical exercise, and emotional response
 - (d) Children that experience prolonged asthma attacks tire easily; watch for signs of failure
 - (2) Assessment
 - (a) Signs and symptoms signs of respiratory distress or failure depend on severity, plus
 - i) Appears anxious
 - ii) Wheezes
 - iii) Prolonged expiratory phase
 - iv) A silent chest means danger
 - (b) History
 - (c) Bronchiolitis and asthma may present very similarly, however, albuterol will not improve bronchiolitis but it will also not harm the patient
 - (3) Management
 - (a) Airway and ventilatory support
 - i) Administer oxygen by tolerated method
 - ii) BVM ventilations for respiratory failure/ arrest (progressive lethargy, poor muscle tone, shallow respiratory effort)
 - iii) Endotracheal intubation for respiratory failure/ arrest with, prolonged BVM ventilations or inadequate response to BVM ventilations
 - (b) Circulatory support
 - (c) Pharmacological interventions
 - i) Albuterol nebulizer
 - ii) Subcutaneous epinephrine 1:1000 only with severe respiratory distress or failure
 - iii) Medications can be repeated if no effect
 - (d) Non-pharmacological interventions
 - (e) Transport considerations
 - i) Allow patient to assume position of comfort
 - (f) Psychological support/ communication strategies

- i) Keep parent/ caregiver with child if appropriate
 b. Pneumonia
 (1) Pathophysiology
 (a) Infection of the lower airway and lung
 - (b) Most common in infants, toddlers and preschoolers (1 5 years of age), but can occur at any age
 - (c) Very common disease process
 - (d) May be caused by bacteria or virus
 - (2) Assessment
 - (a) Signs and symptoms signs of respiratory distress of failure, depending on the severity, plus
 - i) Appears anxious
 - ii) Decreased breath sounds
 - iii) Rales
 - iv) Rhonchi (localized or diffuse)
 - v) Pain in the chest
 - vi) Fever
 - (b) History
 - i) Usually a history of lower respiratory infectious symptoms
 - (3) Management
 - (a) Airway and ventilatory support
 - i) Administer oxygen by tolerated method
 - ii) BVM ventilations for respiratory failure/ arrest (progressive lethargy, poor muscle tone, shallow respiratory effort)
 - iii) Endotracheal intubation for respiratory failure, prolonged BVM ventilations, or inadequate response to BVM ventilations
 - (b) Circulatory support
 - i) Consider IV or IO
 - (c) Pharmacological interventions
 - (d) Non-pharmacological interventions
 - (e) Transport considerations
 - i) Allow patient to assume position of comfort
 - (f) Psychological support/ communication strategies
 - i) Keep parent/ caregiver with child if appropriate
- c. Foreign body lower airway obstruction
 - (1) Pathophysiology
 - (a) Foreign body in the lower airway or lung
 - (b) Rarely progresses rapidly to respiratory failure or arrest
 - (c) Objects are usually food (nuts, seeds, etc.) or small objects
 - (2) Assessment
 - (a) Signs and symptoms signs of respiratory distress or failure, depending on the severity, plus
 - i) Appears anxious
 - ii) Decreased breath sounds
 - iii) Rales
 - iv) Rhonchi (localized or diffuse)
 - v) Pain in the chest

- (b) History
 - i) May be a history of choking if witnessed by an adult
- (3) Management
 - (a) Airway and ventilatory support
 - i) Administer oxygen by tolerated method
 - ii) Consider intubation
 - (b) Circulatory support
 - i) Consider IV or IO
 - (c) Pharmacological interventions
 - (d) Non-pharmacological interventions
 - (e) Transport considerations
 - i) Allow patient to assume position of comfort
 - (f) Psychological support/ communication strategies
 - i) Keep parent/ caregiver with child if appropriate

- B. Shock
 - 1. Pathophysiology
 - a. An abnormal condition characterized by inadequate delivery of oxygen and metabolic substrates to meet the metabolic demands of tissues
 - b. Severity
 - (1) Compensated (early)
 - (a) Patient's blood pressure is normal although signs of inadequate tissue perfusion are present
 - (b) Reversible
 - (2) Decompensated (late)
 - (a) Hypotension and signs of inadequate organ perfusion are present
 - (b) Often irreversible
 - c. Assessment
 - (1) Chief complaint
 - (2) History
 - (3) Physical findings
 - (a) Signs and symptoms compensated shock
 - i) Irritability or anxiety
 - ii) Tachycardia
 - iii) Tachypnea
 - iv) Weak peripheral pulses, full central pulses
 - v) Delayed capillary refill
 - vi) Cool, pale extremities
 - vii) Systolic blood pressure within normal limits
 - viii) Decreased urinary output
 - (b) Signs and symptoms of decompensated shock
 - i) Lethargy or coma
 - ii) Marked tachycardia or bradycardia
 - iii) Marked tachypnea or bradypnea
 - iv) Absent peripheral pulses, weak central pulses
 - v) Markedly delayed capillary refill
 - vi) Cool, pale, dusky, mottled extremities
 - vii) Hypotension

Markedly decreased urinary output

viii)

	2.	Etiology	/		•,	maneary accreaced annaly cuspat		
		a.		olemia -	commo	n		
			(1)		ohysiolo			
			()	(a)	Ďehyd			
				()	i)	Vomiting		
					ii)	Diarrhea		
					iii)	Excessive respiratory excursions		
					iv)	Excessive perspiration		
				(b)	Blood			
				(2)	i)	Trauma		
					ii)	Child abuse		
					,	a) Other, e.g., GI bleed		
			(2)	Signs	and sym	otoms -assess for general compensated or decompensated		
			(2)	shock		stome assess for general compensated of accompensated		
				(a)	Dehyd	ration		
				(α)	i)	Poor skin turgor		
					ii)	Decreased saliva and/ or tears		
					iii)	Sunken fontanelle (infants)		
					iv)	Dry mucosa		
			(3)	Treatn	,	Dry macooa		
			(0)	(a)		ensated		
				(ω)	i)	Oxygen		
				(b)		pensated		
				(6)	i)	Airway and ventilation		
					.,	a) High flow oxygen		
						b) Consider intubation		
					ii)	Circulation		
					")	a) Consider IV or IO		
						b) 20 ml/kg of LR or NS bolus as needed		
					iii)	Transport considerations		
					iv)	Psychological support/ communication strategies		
					1 7	a) Allow patient to assume position of comfort		
				(c)	Cervic	al spine immobilization for trauma		
			(4)	. ,		ncommon		
			(4)	(a)	Etiolog			
				(α)	i)	Sepsis		
					ii)	Neurogenic		
					iii)	Anaphylactic		
				(b)		physiology		
				(2)	i)	Peripheral pooling due to loss of vasomotor tone		
					ii)	Shift of fluid from intravascular space to extravascular		
					,	space		
				(c)	Signs	and symptoms - assess for general compensated or		
				(0)		pensated shock plus		
					i)	Sepsis		
					.,	a) Early - warm skin		
						b) Late - cool skin		
						2, 200 000.0		
						.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
ew York State	EMT-	Critical (Jare Cu	ırriculu	m			

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					ii)	Neurogenic				
					,	a) Warm skin	1			
						b) Bradycardi	ia			
					iii)	Ánaphylactic				
					,	a) Allergic ras	sh			
						b) Airway swe	elling			
				(d)	Trea	ment				
					i)	Compensated				
						a) Oxygen				
					ii)	Decompensated				
						a) Airway and		on		
						b) High flow of				
						c) Consider in	ntubation			
					iii)	Circulation				
						a) Consider I'				
								Sb	olus as needed	
					iv)	Transport consider				
					v)	Psychological suppation Allow paties			nication strategies e position of comf	ort
	3.	Cardio	genic sh	ock					•	
		a.	Pathop	hysiolog	gy					
			(1)			condition characterize				gen and
						ostrates to meet the m	netabolic	den	nands of tissues	
				(a)		nanical pump failure				
				(b)	Usu	lly biventricular				
		b.	Assess							
			(1)			symptoms of compe	ensated	or	decompensated	shock
				depen	_	n severity, plus				
					i)	Rales				
					ii)	Jugular venous dis	stention			
					iii)	Hepatomegaly				
			(0)		iv)	Peripheral edema				
			(2)	History	/					
		C.	Treatm			CI - C				
			(1)	•		entilation				
				(a)		flow oxygen	_			
				/ b.\	i)	Consider intubation	n			
				(b)		lation Consider IV or IO				
					i) ii)		JC balua		naadad	
				(c)		20 ml/kg of LR or N macological	Sulud	as I	needed	
				(c)	i)	Consider adenosin	a if tach	/arrl	hythmia_induced	
					17	CONSIDER AUCHOSIN	ı c ıı tatilv	alli	nvumma-muuceo	

C. Dysrythmias

- Tachydysrhythmias
 - Supraventricular tachycardia a.

(d)

(e)

i)

 $S_{1}, S_{1}, S_{2}, S_{3}, S_{4}, S_{5}, S_{5},$

Transport considerations

Psychological support/ communication strategies

Allow patient to assume position of comfort

- (1) Assessment
 - (a) Signs and symptoms signs of compensated or decompensated shock, plus
 - i) Narrow complex tachycardia rates greater than 220 beats per minute
 - ii) Poor feeding
 - iii) Hypotension
- (2) Management
 - (a) Stable supportive care
 - (b) Unstable
 - i) Airway and ventilatory support
 - a) Oxygen
 - ii) Circulatory support
 - iii) Pharmacological interventions
 - Consider adenosine
 - iv) Non-pharmacological interventions
 - v) Transport considerations
 - vi) Psychological support/ communication strategies
- b. Ventricular tachycardia with a pulse
 - (1) Assessment
 - (a) Signs and symptoms signs of compensated or decompensated shock, depending on severity, plus
 - a) Rapid, wide complex tachycardia
 - b) Poor feeding
 - c) Hypotension
 - (b) History
 - (2) Management
 - (a) Stable supportive care
 - (b) Unstable
 - i) Airway and ventilatory support
 - a) High flow oxygen
 - ii) Circulatory support
 - iii) Pharmacological interventions
 - a) Consider lidocaine
 - iv) Non-pharmacological interventions
 - v) Transport considerations
 - vi) Psychological support/ communication strategies
- 2. Bradydysrhythmias
 - a. Epidemiology
 - (1) Incidence- most common dysrhythmia in children
 - b. Pathophysiology
 - (1) Usually develops as a result of hypoxia
 - (2) May develop due to vagal stimulation (rare)
 - c. Assessment
 - (1) Signs and symptoms compensated or decompensated shock, depending on severity, plus
 - (a) Bradycardia
 - (b) Slow, narrow complex heart rhythm, QRS duration may be normal

or prolonged

- (2) History
- d. Management
 - (1) Stable supportive care
 - (2) Unstable
 - (a) Airway and ventilatory support
 - i) Ventilate patient with 100% oxygen via BVM
 - ii) Intubate patient if poor response to BVM ventilations
 - (b) Circulatory support
 - Perform chest compressions if oxygen does not increase heart rate
 - (c) Pharmacological interventions
 - i) Medications can be given down the endotracheal tube
 - ii) Administer epinephrine
 - iii) Administer atropine for vagally induced bradycardia
 - (d) Non-pharmacological interventions
 - (e) Transport considerations
 - (f) Psychological support/ communication strategies
- 3. Absent rhythm
 - a. Asystole
 - (1) Epidemiology
 - (a) Incidence may be the initial cardiac arrest rhythm
 - (2) Assessment
 - (a) Signs and symptoms
 - i) Pulseless
 - ii) Apneic
 - iii) Cardiac monitor indicating no electrical activity
 - (b) History
 - (3) Management
 - (a) Confirm in two ECG leads
 - (b) Airway and ventilatory support
 - i) Ventilate the patient with 100% oxygen via BVM
 - ii) Intubate patient if poor response to BVM ventilations
 - (c) Circulatory support
 - i) Perform chest compressions
 - (d) Pharmacological interventions
 - i) Medications can be given down the endotracheal tube
 - ii) Administer epinephrine
 - (e) Non-pharmacological interventions
 - (f) Transport considerations
 - (g) Psychological support/ communication strategies
 - b. Pulseless electrical activity
 - (1) Pathophysiology
 - (a) Pneumothorax
 - (b) Cardiac tamponade
 - (c) Hypovolemia
 - (d) Hypoxia
 - (e) Acidosis

(f)	Hypothermia									
(f)	••									
(g)	Hypoglycemia									
Assess	sment									
(a)	Signs and symptoms									
. ,	i) Pulseless									
	ii) Apneic									
	iii) Cardiac monitor indicating organized electrical activity									
(b)	History									
Manag	ement									
(a)	Resuscitation should be directed toward relieving cause									
(b)	Airway and ventilatory support									
. ,	i) Ventilate the patient with 100% oxygen via BVM									
	ii) Intubate patient									

- (c) Circulatory support
 - i) Perform chest compressions
- (d) Pharmacological interventions
 - i) Medications can be given down the endotracheal tube
 - ii) Administer epinephrine
- (e) Non-pharmacological interventions
- (f) Transport considerations
- (g) Psychological support/ communication strategies
- D. Seizure
 - 1. Pathophysiology
 - a. Types

(2)

(3)

- (1) Generalized
- (2) Focal
- 2. Assessment
 - a. Signs and symptoms
 - (1) Generalized
 - (a) Sudden jerking of both sides of the body followed by tenseness and relaxation of the body
 - (b) Loss of consciousness
 - (2) Focal
 - (a) Sudden jerking of a part of the body (arm, leg)
 - (b) Lip smacking
 - (c) Eye blinking
 - (d) Staring
 - (e) Confusion
 - (f) Lethargy
 - b. History
- 3. Management
 - a. Airway and ventilatory support
 - (1) Maintain patent airway
 - (2) Administer high flow oxygen
 - b. Circulatory support
 - c. Pharmacological interventions
 - (1) Consider dextrose if hypogylcemic
 - (2) Consider benzodiazepine if active seizures are present; anticipate need for

ventilatory support

- d. Non-pharmacological interventions
 - (1) Protect patient from further injury
 - (2) Protect head and cervical spine if injury has occurred
- e. Transport considerations
- f. Psychological support/ communication strategies
- E. Hypoglycemia
 - Pathophysiology
 - a. Children have limited glucose storage
 - b. In severe cases, if not treated promptly, can cause brain damage
 - 2. Assessment
 - a. Signs and symptoms
 - (1) Mild
 - (a) Hunger
 - (b) Weakness
 - (c) Tachypnea
 - (d) Tachycardia
 - (2) Moderate
 - (a) Sweating
 - (b) Tremors
 - (c) Irritability
 - (d) Vomiting
 - (e) Mood swings
 - (f) Blurred vision
 - (g) Stomach ache
 - (h) Headache
 - (i) Dizziness
 - (3) Severe
 - (a) Decreased level of consciousness
 - (b) Seizure
 - b. Measure blood glucose
 - c. History
 - 3. Management
 - a. Airway and ventilatory support
 - b. Circulatory support
 - c. Pharmacological interventions
 - (1) Administer Dextrose per medical direction
 - (2) Repeat blood glucose test 10-15 minutes after dextrose infusion
 - d. Non-pharmacological interventions
 - e. Transport considerations
 - f. Psychological support/ communication strategies
- F. Hyperglycemia
 - Pathophysiology
 - a. Leads to dehydration and ketoacidosis
 - Assessment
 - a. Signs and symptoms
 - (1) Early
 - (a) Increased thirst

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- (b) Increased urination
- (c) Weight loss
- (2) Acute (dehydration and early ketoacidosis)
 - (a) Weakness
 - (b) Abdominal pain
 - (c) Generalized aches
 - (d) Loss of appetite
 - (e) Nausea
 - (f) Vomiting
 - (g) Signs of dehydration except decreased urinary output
 - (h) Fruity breath odor
 - (i) Tachypnea
 - (j) Hyperventilation
 - (k) Tachycardia
- (3) If untreated, progresses to
 - (a) Coma
 - (b) Deep and slow respirations (Kussmaul)
 - (c) Signs of severe dehydration
- 3. Management
 - a. Airway and ventilatory support
 - b. Circulatory support
 - c. Pharmacological interventions
 - (1) Consider lactated ringers or NS if signs of dehydration are present per medical direction
 - d. Non-pharmacological interventions
 - e. Transport considerations
 - f. Psychological support/ communication strategies

V. Pediatric Trauma

- A. Pathophysiology
 - 1. Blunt
 - a. Thinner body wall allows forces to be readily transmitted to body contents
 - b. Predominant cause of injury in children
 - 2. Penetrating
 - a. Becoming an increasing problem in adolescents
 - b. Higher incidence in the inner city (mostly intentional), but significant incidence in other areas (mostly unintentional)
- B. Mechanism of injury
 - 1. Fall
 - a. Single most common cause of injury in children
 - b. Serious injury or death resulting from truly accidental falls is relatively uncommon unless from a significant height
 - c. Prevention strategies
 - 2. Motor vehicle crash
 - a. Leading cause of permanent brain injury and new cases of epilepsy
 - b. Leading cause of death and serious injury in children
 - c. Prevention strategies
 - 3. Pedestrian vehicle crash

Adapted from the United States Department of Transportation

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- a. Particularly lethal form of trauma in children
- b. Initial injury due to impact with vehicle (extremity/ trunk)
- c. Child is thrown from force of impact causing additional injury (head/ spine) upon impact with other objects (ground, another vehicle, light standard, etc.)
- d. Prevention strategies
- 4. Near-drowning
 - Third leading cause of injury or death in children between birth and 4 years of age
 - b. Causes approximately 2000 deaths annually
 - c. Severe, permanent brain damage occurs in 5-20% of hospitalized children for near drowning
 - d. Prevention strategies
- 5. Penetrating injuries
 - a. Risk of death from firearm injuries increases with age
 - b. Stab wounds and firearm injuries account for approximately 10-15% of all pediatric trauma admissions
 - c. Visual inspection of external injuries cannot evaluate the extent of internal involvement
 - d. Prevention strategies
- 6. Burns
 - The leading cause of accidental death in the home for children under the age of 14
 years
 - b. Burn survival is a function of burn size and concomitant injuries
 - c. Modified "rule of nines" is utilized to determine percentage of surface area involved
 - d. Prevention strategies
- 7. Physical abuse
 - a. Classified into four categories: physical abuse, sexual abuse, emotional abuse, and child neglect
 - b. Social phenomena such as increased poverty, domestic disturbance, younger aged parents, substance abuse, and community violence have been attributed to increase of abuse
 - c. Document all pertinent findings, treatments, and interventions
 - d. Prevention strategies
- C. Special considerations
 - Airway control
 - a. Maintain in-line stabilization in neutral, not sniffing, position
 - b. Administer 100% oxygen to all trauma patients
 - c. Patent airway must be maintained via suctioning and jaw thrust
 - d. Be prepared to assist ineffective respirations
 - e. Intubation should be performed when the airway remains inadequate
 - f. Gastric tube should be placed after intubation
 - 2. Immobilization
 - a. Indications for stabilization and immobilization of cervical spine
 - b. Utilize appropriate-sized pediatric immobilization equipment
 - (1) Rigid cervical collar
 - (2) Towel/ blanket roll
 - (3) Child safety seat
 - (4) Pediatric immobilization device
 - (5) Vest-type/ short wooden backboard

- (6) Long backboard
- (7) Straps, cravats
- (8) Tape
- (9) Padding
- c. Maintain supine neutral in-line position for infants, toddlers, and pre-schoolers by placing padding from the shoulders to the hips
- 3. Fluid management
 - a. Management of the airway and breathing take priority over management of circulation because circulatory compromise is less common in children than adults
 - Vascular access
 - (1) Large-bore IV catheter should be inserted into a large peripheral vein
 - (2) Do not delay transport to gain access
 - (3) Intraosseous access in children less than 6 years of age if IV access fails
 - (4) Initial fluid bolus of 20 ml/kg of lactated ringers or NS
 - (5) Reassess vital signs and rebolus with 20 ml/kg if no improvement
 - (6) If improvement does not occur after the second bolus, there is likely to be significant blood loss and the need for rapid surgical intervention
- 4. Traumatic brain injury
 - a. Early recognition and agressive managemetn can reduce morbidity and mortality
 - b. Severity
 - (1) Mild GCS is 13 to 15
 - (2) Moderate GCS is 9 to 12
 - (3) Severe GCS is less than or equal to 8
 - c. Signs of increased intracranial pressure
 - (1) Elevated blood pressure
 - (2) Bradycardia
 - (3) Slow, deep respirations (Kussmaul) progressing to slow deep respirations alternating with rapid deep respirations (Cheyne-Stokes)
 - (4) Buldging fontanelle (infant)
 - d. Signs of herniation
 - (1) Asymmetrical pupils
 - (2) Posturing
 - e. Specific management
 - (1) Administer high concentration of oxygen for mild to moderate head injuries (GCS 9-15)
 - (2) Intubate and ventilate at normal breathing rate with 100% oxygen for severe head injuries (GCS 3-8)
 - (a) Use of lidocaine may blunt rise in ICP (controversial)
 - (3) Indications for hyperventilation
 - (a) Asymmetric pupils
 - (b) Active seizures
 - (c) Neurologic posturing
- D. Specific injuries
 - Head and neck injury
 - a. Larger relative mass of the head and lack of neck muscle strength provides increased momentum in acceleration-deceleration injuries and a greater stress to the cervical spine region
 - b. Fulcrum of cervical mobility in the younger child is at the C2-C3 level

- c. 60% to 70% of pediatric fractures occur in C1 or C2
- d. Head injury is the most common cause of death in pediatric trauma victim
- e. Diffuse injuries are common in children, focal injuries are rare
- f. Soft tissues, skull and brain are more compliant in children than in adults
- g. Due to open fontanelles and sutures, infants up to an average age of 16 months may be more tolerant to an increase of intracranial pressure and can have delayed signs
- h. Subdural bleeds in a infant can produce hypotension (extremely rare)
- Significant blood loss can occur through scalp lacerations and should be controlled immediately
- The Modified Glasgow Coma Score should be utilized for infants and young children

2. Chest injury

- a. Chest injuries in children under 14 years of age are usually the result of blunt trauma
- b. Due to the compliance of the chest wall, severe intrathoracic injury can be present without signs of external injury
- c. Tension pneumothorax is poorly tolerated and is an immediate threat to life
- d. Flail segment is an uncommon injury in children; when noted without a significant mechanism of injury, suspect child abuse
- e. Many children with cardiac tamponade will have no physical signs of tamponade other then hypotension

3. Abdominal injury

- a. Musculature is minimal and poorly protects the viscera
- b. Organs most commonly injured are liver, kidney, and spleen
- c. Onset of symptoms may be rapid or gradual
- d. Due to the small size of the abdomen, be certain to palpate only one quadrant at a time
- e. Any child who is hemodynamically unstable without evidence of obvious source of blood loss should be considered as having an abdominal injury until proven otherwise

4. Extremity

- a. Relatively more common in children than adults
- b. Growth plate injuries are common
- c. Compartment syndrome is an emergency in children
- d. Any sites of active bleeding must be controlled
- e. Splinting should be performed to prevent further injury and blood loss.
- f. MAST (PASG) may be useful in unstable pelvic fractures with hypotension

5. Burns

- a. Thermal
- b. Chemical
- c. Electrical
- d. Management priorities
 - (1) Prompt management of the airway is required as swelling can develop rapidly
 - (2) If intubation is required, an endotracheal tube up to two sizes smaller than what would normally be used may be required
 - (3) Thermally-burned children are very susceptible to hypothermia; maintain

normal body temperature

(4) Suspect musculoskeletal injuries in electrical burn patients and perform spine immobilization techniques

VI. Sudden Infant Death Syndrome (SIDS)

- A. Epidemiology
 - Risk factors
 - a. Occurs most frequently in the fall and winter months
 - b. Minor illness (cold or upper respiratory infection) within two weeks prior to the death
 - c. Premature and low birth-weight infants
 - d. Infants of young mothers
 - e. Infants of mothers who did not receive prenatal care
 - f. Infants of mothers who used cocaine, methadone, or heroin during pregnancy
 - Prevention strategies
- B. Pathophysiology
 - 1. Sudden and unexpected death of a seemingly healthy infant which remains unexplained even after a thorough postmortem examination
 - 2. No prior symptoms of life-threatening illness
 - 3. Death usually occurs during sleep
 - 4. No definitive answer at this time
 - 5. A small percentage is abuse related
 - 6. Many victims of SIDS appear to have suffered from long-term underventilation of the lungs, possibly due to poor control of breathing during sleep; prone positioning may be a factor
 - 7. Abnormalities in the brainstem
- C. Assessment
 - 1. Signs and symptoms
 - No external signs of injury
 - b. Lividity
 - c. Frothy blood-tinged drainage from nose/ mouth
 - d. Rigor mortis
 - e. Evidence that the baby was very active just prior to the death (i.e., rumpled bed clothes, unusual position or location in the bed)
 - 2. History
- D. Management
 - 1. Airway and ventilatory support
 - 2. Circulatory support
 - 3. Pharmacological interventions
 - 4. Non-pharmacological interventions
 - 5. Transport considerations
 - 6. Psychological support/ communication strategies
 - a. Initiate CPR unless the infant is obviously dead (unquestionably dead to a lay person)
 - b. Perform ALS as indicated
 - c. Be prepared for the range of possible family emotional reactions
 - d. Parents/ caregiver should be allowed to accompany the baby in the ambulance
 - e. Explain that certain information regarding the infant's health is necessary to determine the care to be given
 - f. Utilize the baby's name

- g. Questions should be phrased so blame is not implied
- h. Debriefing
- Resources for SIDS families

VII. Child abuse and neglect

- A. Epidemiology
 - 1. Second leading cause of death in infants less than 6 months of age
 - 2. Between 2,000 and 5,000 children die each year due to abuse and neglect
- B. Age considerations
 - 1. Under 18 years of age
 - 2. Physically or mentally handicapped person under 21 years of age
- C. Abuse or neglect perpetrators
 - 1. Parent, legal guardian, foster parent
 - 2. Person, institution, agency, or program having custody of the child
 - 3. Person serving as a caretaker (i.e., babysitter)
- D. Abuse
 - 1. Types
 - a. Physical
 - b. Emotional
 - c. Sexual
 - 2. Abuse indicators
 - a. Historical
 - b. Psychosocial
 - c. Signs of physical abuse
 - d. Signs of emotional abuse
 - (1) Physical indicators
 - (2) Behavioral indicators
 - e. Signs of sexual abuse
- E. Neglect
 - 1. Types
 - a. Physical
 - b. Emotional
 - 2. Neglect indicators
 - a. Behavioral
 - b. Physical
- F. EMT-Critical Care Technician role in treating abuse and neglect
 - 1. Assess the injuries/ neglect and render appropriate care
 - 2. Look at the environment for condition and cleanliness
 - 3. Look for evidence of anything out of the ordinary
 - 4. Look and listen to caregiver/ family members
 - 5. Assess whether the explanation fits the injury
 - 6. Document all findings thoroughly
 - 7. Report suspicion
 - a. Mandated reporter
 - b. Immunity from liability
- G. Resources for abuse and neglect
 - 1. State, regional, and local child protection agency
 - 2. Hospital social service department

Special Consideration: Pediatric W444444444444444444444444444444444444	s: 6 :s: 3 1444

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